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Review of salient trends and issues on energy development and use in the context of sustainable development: new financial mechanisms and economic instruments to speed up the investment in sustainable energy development

Financial mechanisms and economic instruments to speed up the investment in sustainable energy development**

Report of the Secretary-General

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Introduction

1. Investment capital for sustainable energy is the scarcest resource in the developing countries owing to, *inter alia*, immature commercial capital markets and high demand for other priority investments and immediate needs. On the other hand, energy is a crucial component for social and economic development of countries. Owing to the complex nature and structural requirements of energy systems, large investment capital is required to develop the energy infrastructure. Furthermore, since sustainable energy technologies are not as mature as conventional energy technologies and the support infrastructure is also not well developed, the up-front capital and installation costs for sustainable energy technologies are higher than traditional fossil fuel-based energy technologies. Thus, the deployment of sustainable energy services in the developing countries will be a major challenge for the development community in the near and medium term.

2. The shortfall in modern energy supply in the developing countries is significant. It is estimated that 2 billion people in developing countries still do not have access to modern basic energy services or reliable electricity supplies for social and economic development. To meet this energy services requirement, substantial investments in energy systems are needed. An estimated $100 billion to 300 billion per year for the next 20 years is required in the developing countries to meet the current shortfall in energy demand. Furthermore, if developing countries are going to leapfrog from traditional energy technologies to modern sustainable energy technologies, the needed investment capital will be even greater.

3. The financing of energy infrastructure projects in developing countries has been shifting from Governments, State-owned utilities and multilateral financial institutions to domestic and international private financial firms and energy companies. This shift is primarily attributable to the energy sector reforms that developing countries have been undertaking over the past decade with the encouragement of the multilateral institutions. In the reformed sector, the Governments of developing countries will play the role of setting policy, rules and regulations for the sector, while the private sector will finance, build and manage the energy infrastructure. With the increased flow of private capital for energy financing to the developing countries, the multilateral institutions have focused more on technical, policy and institutional assistance than on direct lending in the liberalized energy market.

I. Financing and investments

4. To assist the developing countries with the expansion of their energy sector, multilateral agencies offer concessional funds to supplement the shortfall in domestic investment capital. The World Bank group commitments in the energy sector during 1995 to 1998 fiscal year amounted to an average of US$ 3.5 billion a year. In addition to traditional multilateral resources, specialized environmental funds are also available to assist in sustainable energy investments in the developing countries. The World Bank/Global Environment Facility (GEF) loans, credits, and grants over the period 1992-1997 totalled US$ 275 million for renewable energy projects. The renewable energy components in the projects in the 1999-2001 pipeline include a total of approximately US$ 900 million in World Bank and GEF support. The pipeline projects include the free standing renewable energy projects whereby energy service companies (ESCOs) in concession contracts will install over 100,000 solar home systems (SHS) in rural areas of Argentina, as well as the China Renewable Energy Development project which will install 190 megawatts (MW) of wind farms and 200,000 SHS in rural households.

II. Investment policies in general

5. Policies to induce the flow of investment capital for sustainable energy technologies have been experimented with in a few countries and other policy instruments are being devised to accelerate the implementation of sustainable energy systems. In the United States of America, the Public Utilities Regulatory Policy Act (PURPA) promoted the installation of 9,000 MW of biomass-fuelled power generation in the 1980s as well as the development of wind power and to some extent solar thermal power generation. Targeted policies to increase the percentage of renewable energy in the power supply mix of utilities include the Renewables Non-Fossil Fuel Obligation (NFFO) in the United Kingdom of Great Britain and Northern Ireland and the Renewable Portfolio Standard (RPS) in the United States. These

policy instruments encourage an increase in the percentage of renewable energy in the power supply mix.

6. In China, a novel approach to granting wind resource concessions to project developers is currently being studied to speed up the development of wind power, while in Argentina, private companies will be invited to bid on concessions to provide electricity on a least-cost basis to off-grid dispersed rural communities. Further details on the policy instruments are described briefly below.

The Public Utilities Regulatory Policy Act (PURPA) in the United States

7. The PURPA, passed in 1978, requires that all utilities in the United States must buy electricity from qualified independent power producers (IPPs) at the avoided cost of electricity generated by the utilities. The Act provides IPPs with a secured market for its electricity and the ability to obtain power purchase contracts with predictable revenue streams. The introduction of the PURPA has successfully established an IPP industry and the deployment of renewable energy technologies in the United States.

Renewable portfolio standard (RPS)

8. The terms of the renewable portfolio standard (RPS) require that every retail power supplier provide a certain minimum percentage (or floor) of electricity from specified renewable sources for a given time period. A RPS may also include a credit trading system whereby suppliers can sell credits for the extra renewable power they have generated or vice versa. If they are short of renewable power, they can purchase credits to make up the difference in order to settle their account. Legislation establishing renewable portfolio standards has been passed in a number of States in the United States.

Renewables Non-Fossil Fuel Obligation (NFFO)

9. The United Kingdom Renewables NFFO also requires that electric utilities maintain a minimum percentage of their supply mix as renewable energy. The incremental cost between renewable energy and baseline energy is paid by the Non-Fossil Purchasing Agency with tax collected from utilities for the consumption of fossil fuels.

Wind energy resource concession

10. A wind resource concession for a designated region is issued by the Government in a competitive process to companies for exploration and development over a specified period of time. The Government will also issue the rules and regulations for the development of the resource and the sale of electricity to the power grid when requesting tender for the concession. The Chinese Government is currently assessing this approach to wind power development in China.

Rural electrification concessions

11. To provide electricity services to the dispersed rural population in north-west Argentina without extending the electric grid, concession contracts will be competitively tendered to ESCOs. It is expected that solar home systems, small wind turbines, and mini-hydro schemes will be competitive on a cost basis with diesel generators.

III. Investment capital

12. Investment capital in the form of equity and debt and grant funds from development assistance sources may be obtained to finance sustainable energy projects. The three most common type of finance capital and the associated risk of each form are briefly explained below:

- Equity: high-risk financing that expects high returns. An equity investment can be made in a project or in a company carrying out the project. Equity investors maintain the right to become involved in the decision-making process of the project or company in order to protect their investment;
- Debt: medium risk with medium expected returns. In contrast to equity investors, lenders who provide debt financing to a project do not own shares in the project. They provide capital for the purpose of earning interest. Because lenders must be repaid before distributions can be made to shareholders, they bear less risk. For this reason, potential returns to lenders are limited to risk-adjusted market interest rates;
- Grant: no expected returns. Governmental and international organizations offer grants to promote environmental and development policies.

Renewable energy (RE) projects are often eligible for these funds.

Sources of equity financing

13. Sources of equity financing include project developers, venture capitalists, equity fund investors, equipment suppliers, multilateral development banks, and institutional and individual investors (see tables 1 and 2). Their roles are described below:

- Project developers: a project developer initiates the project idea and usually invests the "up-front capital" that is necessary to develop a project from a concept to an actual project. The project developer usually leverages up-front capital inputs for a larger equity stake in the project. If the project developer retains ownership after the project becomes operational, the developer may be called an independent power producer;
- Venture capitalists: the venture capitalist specializes in investing in new companies. Because venture capitalists join companies in their earliest and riskiest stages, they expect to earn unusually high returns;
- Equity fund investors: equity funds provide investment capital in a project in return for a share of the equity of the project. The expected return on equity is generally two or more times greater than return on debt. In return for the higher expected yield, equity investors bear the greatest risks and have rights to distributions from the project only after all other financial and tax obligations are met;
- Equipment suppliers: reliable, experienced RE equipment supply companies often construct, install and operate RE systems but also offer equipment financing. In addition to turnkey system delivery and operation, the RE technology vendor may offer favourable financing terms;
- Regional development banks: these are regional development banks like the Asian Development, the Inter-American Development Bank (IDB) and the International Finance Corporation (IFC). These institutions not only provide debt financing, but can also provide minority equity financing;
- Institutional and individual investors: these are organizations or individuals who are willing to invest in projects on an equity basis in the hope of earning high returns on their investments;
- Joint ventures: in a joint venture project, a local and a foreign company may jointly invest to develop a project to meet local legislation on foreign ownership of companies and projects. The joint venture project may benefit from the comparative advantages and the financial equity that each company brings to the project.

Sources of debt financing

14. These sources are described directly below:

- A principal source of debt financing is international and national commercial banks. Other sources of debt financing include multilateral development banks (MDBs) and IFC, international and national commercial banks, debt/equity investment funds, equipment suppliers, and private investors. These banks can play a major role by syndicating the debt financing of a major project among several banks so as to minimize their own risk exposure on a project;
- Subordinated debt is another form of financing which falls between debt and equity. Principally, subordinated debt is provided by a "friendly investor" or project partner and is subordinated to other primary debt in case of project default. In return, subordinated debt usually commands a higher interest rate than normal debt to reflect the higher risks associated with this investment.

Sources of grant financing

15. Sources of grant financing include GEF, international and bilateral agencies, foundations, and national and local agencies. They are described below:

- Global Environment Facility (GEF): GEF has become an important source of grant financing especially for RE projects. One of the mandates of GEF is to support projects that help reduce greenhouse gas (GHG) emissions. As a result, many RE projects are targeted by GEF for support to help ultimately improve the

competitiveness of these projects in comparison with conventional fossil energy projects. GEF is the financial mechanism of the United Nations Framework Convention on Climate Change;[1]

- International and bilateral development agencies: many international and bilateral development agencies, such as the United Nations Development Programme (UNDP), the Netherlands Ministry of Development Cooperation (DGIS), the Danish International Development Agency (DANIDA) and so forth can and do provide grant assistance for RE projects;
- Foundations: a number of philanthropic agencies such as the Ford Foundation and the Rockefeller Foundation have, on occasion, provided grant funds for RE projects to help advance such projects in those cases where they have demonstrated environmental and social benefits;
- National and local agencies: in a number of countries, support for RE projects is also available from national and local agencies. A specific example is India where there is a Federal Ministry for Non-Conventional Energy Sources as well as State renewable energy development agencies.

Table 1
Multilateral development agency support for sustainable energy projects

Type of service	*World Bank*	*IFC*[a]	*MIGA*[b]	*RDBs*[c]	*UNDP*[d]
Feasibility studies/assistance for project development	X	X		X	X
Equity investment		X		X	
Debt financing	X	X		X	
Investment co-financing	X	X		X	
Loan guarantees			X		
Lease guarantees			X		
Political risk insurance			X		
Technical assistance and training	X	X		X	X

[a] International Finance Corporation.
[b] Multilateral Investment Guarantee Agency.
[c] Regional development banks.
[d] United Nations Development Programme.

Table 2
Private sector investor support for sustainable energy projects

Type of service	*Commercial banks*	*Venture capitalists*	*Institutional investors*	*Individual investors*	*Equipment suppliers*
Equity investments		X	X	X	X
Debt investments	X		X	X	
Debt/equity swaps	X				
Project co-financing	X				
Equipment financing	X				X

Emerging financing models

16. A number of innovative financing models are emerging to help meet the growing demand for the financing of renewable energy projects. These innovative financing mechanisms are designed to overcome the principal barriers that RE projects face. A brief description of some of the emerging RE financing mechanisms is presented below:

- RESCOs/micro-utilities/cooperatives: RESCOs or renewable energy service companies along with concepts for micro-utilities or cooperatives are all designed to overcome two key barriers that small-scale RE projects face: high initial capital costs for end-users, and aggregation to reach a critical mass that is attractive for financing. The RESCO concept is most suitable for small-scale RE systems like photovoltaic (PV) solar home systems (SHS). Rather than sell SHS to homeowners, the RESCO sells the service (for example, lighting) that is produced by the SHS and in turn collects a monthly fee. This is very similar to what utilities do with electricity from their power plant. In this approach, the RESCO is responsible for owning, operating and maintaining the SHS while the consumer is responsible only for paying for the service. The RESCO, in turn, can aggregate a large number of consumers into a single project and seek financing for the project rather than for each individual SHS. The consumer overcomes the high cost barrier by having only to make small monthly payments;

- RE leasing companies: the RE leasing company concept is very similar to the RESCO approach with one key exception: the leasing companies are usually not responsible for maintaining and operating the RE systems. The leasing company approach helps overcome the high first-cost barrier; it helps as well to aggregate project financing and target it to a few business-oriented entities. This latter point is important for banks and investors. In addition, the leasing company approach provides certain tax benefits for a project which can help the financial attractiveness of the project;

- RE vendor credits: RE vendors are now recognizing what automobile and appliance vendors have known for a long time: providing credit to customers can help boost sales. RE vendors of both small- and larger-scale RE systems are now extending supplier credits to RE consumers and projects to help close financing gaps and in the process to help secure their sales. RE vendor credits can help overcome some of the perceived technology risks associated with many RE technologies. Consumers and project financiers are more likely to reduce their perception of technology risks if the equipment vendors are willing to back their products financially;

- Targeted project credits: multilateral development banks (MDBs) have recently used the approach of "targeted project credits" to supply financing through national and local banks for RE projects. In many cases, national and local banks may not be familiar with or willing to enter new markets or they may have limited financial resources and therefore service their traditional clients first. By targeting credits for RE projects, the MDBs have encouraged the national and local banks to explore these new and emerging markets. This approach has helped the national and local banks develop the knowledge and expertise for assessing similar projects in the future, thereby expanding their market base to include RE project financing. Targeted project credits help overcome the "no track record" financial barrier often faced by new and emerging technologies;

- Direct consumer credits: many low-income rural consumers do not have the ability to establish credit with which to purchase high capital cost RE systems. In these cases, the market potential for RE systems is severely limited. Attaching a consumer credit programme to the RE project will help extend the reach of the RE systems to a larger percentage of the market, particularly to those financially viable consumers who have no established credit or cash to purchase the RE systems outright;

- Acceptance of equipment as collateral by suppliers: many commercial banks are unwilling to lend to RE projects because they do not consider the RE equipment acceptable collateral against their loans. The primary reason is that they are unsure of the secondary market for the RE equipment. To overcome this barrier, RE equipment suppliers are beginning to indicate their willingness to repurchase their equipment at a prescribed discount in the event the project fails financially. In these cases, commercial banks are more willing to accept RE equipment as collateral when financing RE projects;

- Support for project preparation/development: one of the principal barriers identified for RE projects is the high project-development-costs-to-investment ratio. In recognition of this fact, a number of multilateral, bilateral and national sources have established funds or programmes to help RE project developers overcome these high development costs. These are specifically technical assistance grants that, in some cases, are repayable when the project reaches financial closure. The eligibility and conditions for project preparation assistance vary considerably according to the objectives of the supplier of the funds;

- Financial bundling: to achieve critical mass in the request for financing and to reduce the transaction costs of small financial assistance requests, a number of small-scale RE projects may be bundled into one single financing package for submission to the financial institution. This financing technique allows small RE projects to access large financial institutions.

IV. Economic, legal, policy and regulatory issues

17. An array of fiscal incentives, market mechanisms and regulatory instruments are available to encourage a faster uptake of sustainable energy in the power supply mix. A selected set of economic incentives and policy instruments that are available are briefly discussed below.

Economic incentives and market mechanisms

Investment tax credits

18. A tax credit is provided based on the investment cost of the project.

Production tax credits

19. This type of credit provides the investor or owner of qualifying property with an annual tax credit based on the amount of electricity generated by that facility. By focusing on production, improved project performance is encouraged.

Property tax reductions

20. Reductions in property taxes can be used to promote development of renewable energy projects, especially wind energy, by decreasing the tax burden associated with owning a wind power facility. The tax burden for wind power projects is higher compared with that for the use of fossil energy, since a greater land area of land is required per kilowatt hour (kWh) of output. The disadvantage of this mechanism is that it produces an incentive for development, not a market per se.

Accelerated depreciation

21. Tax depreciation is a non-cash expense meant to approximate the loss of asset value over time. It is defined as the portion of an investment that can be deducted from taxable income in any given year. Accelerated depreciation results in tax benefits early in a project's life, and is preferred by investors because an after-tax dollar is worth more today than in later years.

Direct production incentives

22. Although similar to a production tax credit, direct production incentives provide cash income directly. The United States Government offers 1.5 cents per kWh in production incentive to non-profit organizations that own wind facilities.

Investment assistance

23. Governments can offer soft loans with average interest rates of 1 to 2 per cent below the rates in the capital market. Rates are fixed for the duration of the loan and thus provide easier financing for renewable energy technologies.

"Long-term avoided cost standard offer contracts" for small and distributed projects

24. During the 1980s, long-term standard offer contracts (the so-called Standard offer 4 contracts) that guaranteed energy and capacity payments 10 years into the future (and saved on transaction costs) were pivotal in the development of the wind electric and solar thermal electric industries in California. Owing to the contracts, over 1,000 electrical MW (MWe) of wind generation capacity and over 400 MWe of solar thermal electric power generation capacity were developed commercially. The guaranteed prices were based on each utility's "full avoided cost" of marginal generation assuming continuously escalating energy prices (which did not materialize). As these contracts have been renewed, the new prices have been much lower and threaten the viability of operating systems.

Policy and regulatory instruments

Denmark: Windmill law

25. This law requires electric utilities to purchase output from private wind turbine owners at 85 per cent of the consumer price of electricity plus ecotax relief, or about kroner 0.62, or 9 cents per kWh. Electric utilities receive kroner 0.10 or 1.5 cents per kWh production subsidy for power generated by wind.

Denmark: Energy 21

26. In earlier years, Denmark undertook development of wind energy to lessen dependence on imported oil. Now development is tied to its Energy 21 goal of reducing carbon dioxide (CO_2) emissions by 20

per cent by 2005. This translates into an initial 1,500 MW of wind capacity on land and later, by 2030, 4,000 MW offshore. This plan also encourages support at the grass-roots level as local planning boards have been asked to include wind in their energy plans.

Germany: Electricity feed law (EFL)

27. Since 1991, the Electricity feed law (EFL) has obliged electric utilities to purchase renewable energy at guaranteed prices equal to 90 per cent of retail price. As an example, for wind energy, this amounts to deutsche mark (DM) 0.1715, or 10.5 cents per kWh in 1997 for the life of the plant — a significant stimulus to development. In the future, as prices come down in Europe's more competitive, liberalized electricity market, the guaranteed price is expected to be lower — about 2 per cent less in 1998. This type of decrease is expected to gradually put economic pressure on developers. In addition, the electric utilities are opposed to the EFL because of the burden it places on them.

Germany: 250 Megawatt programme

28. The goal of the 250 Megawatt programme is to carry out a broad test over several years of the application of wind energy on a commercial scale. As an incentive for their participation in the programme, operators of the wind turbine/wind farm receive grants for the successful operation of their facilities. The current benefit is either DM 0.06 or 0.08 (about $0.03 or $0.04) per kWh depending on whether the energy is fed into the grid or used by the owner of the turbine, respectively.

Renewable energy set-asides

29. In California, a recent ruling provides for a 0.7 per cent surcharge on electric bills to support renewables during the four-year transition to a competitive market. Some 300 MW of new wind energy projects won the opportunity to receive California Energy Commission financial incentive funds.

Net metering or net billing

30. Under this system, utility customers are guaranteed a market for their power by being permitted to operate a "reversible meter". When customers use more electricity than they generate, they pay for the additional electricity at retail prices as usual. Conversely, when customers generate more electricity than they use, the electric utility is obliged to purchase the additional electricity. The price that customers receive for their excess electricity varies widely by region and between wholesale and retail levels. So far, experience in net metering is limited.

V. Multilateral financing mechanisms

31. There are a number of multilateral, bilateral and private sector programmes that are available or emerging that will help support sustainable energy projects. Specifically, the MDBs are aware of and are taking action to direct their energy sector investments towards more sustainable development. For example, the World Bank has established the Asia Alternative Energy Programme (ASTAE) which is chartered to develop only RE and energy efficiency projects. Since its inception, ASTAE has helped the World Bank lend over US$ 250 million for RE projects in the Asia region. IFC has launched two solar PV initiatives — the Solar Development Group and the Photovoltaic Market Transformation Initiative (PVMTI) — focused on private sector-initiated projects.

Economic instruments for promotion of investments

32. Three multilateral economic instruments are highlighted to illustrate the mechanisms that are being utilized by the different multilateral organizations in promoting sustainable energy investments.

FINESSE (Financing Energy Services for Small-Scale End-users)

33. Financing Energy Services for Small-Scale End-users (FINESSE) focuses on the formulation of policy, institutional/regulatory framework and capacity development to provide technically feasible and economically viable RE technologies and energy efficiency services to residential, commercial, agro-industrial, and institutional energy users in developing countries. The FINESSE concept resulted from the recognition that traditional energy sector lending by multilateral and bilateral institutions was biased towards large-scale fossil and hydro-based projects. This narrow focus of the traditional energy sector on

supply-driven large-scale projects ignored the basic energy needs of the majority of people residing in rural communities and did not properly address the energy efficiency improvement potential of residential, commercial and industrial sectors. The FINESSE concept was initiated in 1989 jointly by the World Bank, the United States Department of Energy (USDOE), the Netherlands Directorate for International Cooperation (DGIS) and UNDP.

34. The FINESSE concept is both an operational research methodology and an energy development approach. Central to the concept is the need to mitigate recognized barriers to the development and widespread use of sustainable energy services. It is a piloting activity that aims at making financial resources of multilateral lending institutions available to small-scale energy users who often have no means of accessing credit. Large multilateral financing institutions are encouraged to provide "wholesale" loans to intermediary organizations such as commercial banks, utilities and non-governmental organizations. Through the implementation of the FINESSE concept, the multilateral financing institutions are able to provide financial resources to small-scale energy users without incurring high overhead costs in administering small loans. The intermediary organization then provides loans at market rates to the potential small-scale energy end-users.

35. Currently, FINESSE is operational in selected countries in Asia and Africa. The FINESSE concept is implemented by UNDP with support from DGIS, and the Organization of the Petroleum Exporting Countries (OPEC) Fund for International Development.

The United Nations Foundation (UNF)

36. The goals and objectives of the United Nations Foundation (UNF) are to support the work of the United Nations in economic, social, environmental and humanitarian causes. One of two primary environmental issues that UNF addresses is the concern associated with global climate change, the other environmental issue being loss of biological diversity. In the climate change area, the Foundation assists in the implementation of relevant agendas that result from the continued work of the United Nations Framework Convention on Climate Change. The Foundation primarily supports activities on the use of market mechanisms and sustainable energy technologies to meet the objectives of the Framework Convention.

37. In carrying out its mandate to address global climate change, the UNF provides resources for projects in the areas of human capacity-building, energy efficiency, RE, technological leapfrogging, and the design of economic and regulatory frameworks. Only United Nations agencies can apply for support directly to the Foundation. Furthermore, UNF encourages collaboration between two or more agencies of the United Nations when support is applied for.

World Bank Asia Alternative Energy Programme (ASTAE)

38. The World Bank, along with key bilateral donors, established the Asia Alternative Energy Programme (ASTAE) in January 1992, as a follow up to project FINESSE. ASTAE's mission is to mainstream alternative energy (RE and energy efficiency) services in the energy and non-energy lending operations of the World Bank, with priority emphasis on the Asia region. To support this goal, ASTAE works with both Bank staff and client country decision makers to incorporate alternative energy options into the design of energy sector strategies and lending operations for all the Bank's client countries in Asia. Since its inception, ASTAE has increased the lending portfolio for alternative energy projects in Asia from about US$ 2.0 million in fiscal year 1992 to over US$ 1 billion (fiscal years 1993-2003). These investments are projected to result in over 1 gigawatts (GW) of avoided fossil fuel-based capacity through RE capacity additions and energy efficiency demand reductions.

39. ASTAE provides assistance in the identification and preparation of RE and energy efficiency/demand-side management (DSM) projects for World Bank- and GEF-supported operations in Asia. ASTAE also offers technical assistance in improving local technical expertise, system performance, and institutional capability to design and implement alternative energy investment programmes in the client countries. Such activities have included: training modules in energy efficiency and RE options; formulation of alternative energy policies; design and implementation of pilot innovative delivery mechanisms; technical support to improve the performance and availability of alternative energy systems; and strengthening of institutional capacities. In addition to increasing the RE and energy efficiency portfolio in power sector lending, ASTAE is

also working to increase the inclusion of alternative energy services components in non-energy sector lending.

Existing financing mechanisms

40. The primary multilateral financing mechanisms that are currently under operation are briefly summarized in the present section.

Solar Development Group (SDG)

41. The World Bank, IFC and a group of United States charitable foundations initiated the Solar Development Group (SDG) with the overall objective of accelerating the growth of viable private-sector business activities in the distribution, sales and financing of off-grid PV applications in developing countries. The capitalization of SDG is US$ 50 million for investment in SHS deployed on rural houses. SDG, acting as a privately managed fund, will invest in PV-related businesses including local assemblers, distributors, retailers and energy service companies as well as in financial intermediaries such as banks, leasing companies, non-governmental organizations and other non-bank financial intermediaries. Approximately US$ 32 million will be earmarked as an investment fund, while US$ 18 million will be used to support in-country business advisory services (BAS). The investment fund will provide debt and equity capital. BAS will provide technical assistance to potential businesses and companies. SDG activities are being initiated and the pilot project will operate for five to eight years.

42. SDG aims to overcome the key barriers to accelerated growth of PV in the off-grid segment — including lack of medium-term funding to enable customers to repay the high initial cost of PV systems over time, lack of understanding of PV by conventional financial intermediaries (FIs) and weak capitalization of many indigenous PV companies — through the provision of both financing and business advisory services. To achieve these aims, SDG will: (a) invest in private sector companies involved in rural commercially sustainable PV activities, including the distribution, sale, lease-hire, or financing of PV solar home systems and other productive use PV systems for electricity generation and (b) provide financing to local FIs that will service such companies.

Global Environment Facility (GEF)

43. GEF is a financial mechanism of international environmental agreements including the United Nations Framework Convention on Climate Change. The three implementing agencies of GEF are UNDP, the United Nations Environment Programme (UNEP) and the World Bank. GEF resources are used to support the incremental cost of environmentally beneficial projects relative to the cost of the baseline project. GEF provides grants and concessional finance for project development activities, enabling activities and full projects. Projects supported by GEF must be country-driven and based on national development priorities.

44. The three operational programmes of GEF that focus on climate change mitigation and sustainable energy technologies are:

- Operational Programme (OP) 5: Removing barriers to energy efficiency and energy conservation;
- OP 6: Promoting the adoption of RE by removing the barriers and reducing implementation costs;
- OP 7: Reducing the long-term costs of low greenhouse gas-emitting energy technologies.

45. The Enabling Activities are specifically designed to assist non-annex I countries (primarily developing countries) in meeting their communications obligations and the overall objectives of the Framework Convention. Projects that do not qualify under the "long-term operational programmes" or the Enabling Activities but are high national priority and are cost-effective may be considered under the Short-term Response Measures.

46. GEF also administers the Small Grants Programme (SGP) that provides grants up to US$ 50,000 for projects that are designed and implemented by local community organizations and non-governmental organizations and that meet the objectives of GEF. SGP is implemented by UNDP. The types of activities eligible for SGP include community-based demonstration programmes, pre-project community-based assessment and planning activities, targeted research with emphasis on indigenous knowledge and management systems, and information dissemination, networking and policy dialogue.

Photovoltaic Market Transformation Initiative (PVMTI)

47. The aim of PVMTI is to accelerate the commercialization of the PV market in three countries (India, Morocco and Kenya). GEF has committed US$ 30 million to the Initiative and it is expected that the private sector, possibly IFC and/or other co-financing investments will leverage an additional three to four times the GEF committed amount. PVMTI began operation in June 1998 and will operate for 10 years. IFC is the executing agency of PVMTI.

48. PVMTI was initiated with the premise that the potential for the off-grid PV market is very large, since 300 million to 400 million households in developing countries lack access to dependable power. The types of projects envisaged are SHS in the 20-500 peak-watt (W_p) range and small power plants serving commercial end-users, municipalities and villages, in the 50 kW to 5 MW range that may also use hybrid technologies (solar systems backed by wind or diesel/gas generators).

49. PVMTI will provide investments in the range of US$ 0.5 million to US$ 5.0 million per project that shows promise for large-scale expansion of the market for PV. The PVMTI support will be provided in the form of grants or various non-grant-financing modalities. However, in Morocco and Kenya, the projects need to leverage additional minimum resources 1:1, while in India the project developers need to leverage three times the PVMTI resource. The expected outcomes of the Initiative are increased market activity, reduced market barriers to PV dissemination and successful demonstration of private-sector-based financing schemes. PVMTI investments will be managed by an external team specializing in RE financing and technical and programme oversight under close supervision by IFC.

Proposed financing mechanisms

50. Two of the proposed financing mechanisms for sustainable energy development have as their primary objective the reduction of greenhouse gas emissions in support of the Framework Convention. One of the mechanisms is entirely a private sector initiative while the last mechanism is a regional instrument initiated by the World Bank to expand energy access in rural areas of Africa.

Clean Development Mechanism (CDM)

51. Article 12 of the Kyoto Protocol[2] to the Framework Convention established the clean development mechanism (CDM). The purpose of CDM is to assist non-annex I parties to the Framework Convention in achieving sustainable development and to assist annex I parties in achieving compliance with their emission limitations or reduction commitments under the Kyoto Protocol. CDM is one of three flexibility mechanisms of the Kyoto Protocol. The rules and modalities for CDM are still currently under negotiation by parties to the Framework Convention. It is envisaged that when CDM becomes operational, Governments and private enterprises in the industrialized countries (annex I parties) will invest in projects in developing countries that reduce greenhouse gas emissions with respect to baseline projects. Sustainable energy projects will form a significant portion of these CDM projects. Under the rules of CDM that may be agreed upon in the future, the certified carbon emission reductions that occurred owing to the alternative/CDM project can be transferred to the project supporter in the developed country.

52. CDM can significantly stimulate the development and implementation of low carbon emitting energy projects as well as RE and energy efficiency activities. The implementation of sustainable energy/greenhouse gas (GHG) mitigation projects in developing countries may also result in significant transfer of technology. Furthermore, the provision of better energy services will improve the living standards in developing countries.

Prototype Carbon Fund (PCF)

53. The Prototype Carbon Fund (PCF) is being established in the World Bank with contributions from Governments and private companies. PCF will invest in cleaner technologies in developing countries and transition economies, primarily in RE technologies such as wind, small hydro, and biomass energy technology. The independently verified and certified emissions reduction credits that result from the cleaner technologies will be transferred to the Fund's contributors. The Fund is capped at US$ 150 million, and will start operations soon. The Fund is expected to terminate at the end of 2012.

54. During the next three years, PCF plans to invest all the capital in about 20 projects that have mostly been identified by the World Bank group, but projects can also originate from the private sector, other multilateral development banks or bilateral donors. In some cases, PCF plans to finance some projects through local carbon funds modelled on PCF but using financing from local commercial and development banks, as well as private companies.

55. Developing countries are expected to benefit from the projects that are supported by investment funds from PCF, since cleaner technologies will be installed in the countries. Industrialized countries and private companies will also gain since they will be able to obtain certified carbon emissions reduction credits at a lower price than from reducing carbon emissions within their own companies or countries. PCF plans to incorporate any agreements and rules that may be adopted by parties to the Framework Convention with respect to the Kyoto Protocol and its flexibility mechanisms: joint implementation (JI) and CDM.

Africa Rural and Renewable Energy Initiative (AFRREI)

56. The objective of the Africa Rural and Renewable Energy Initiative (AFRREI) is to expand energy access in rural areas of Africa where rural population is increasing faster than rural access to modern energy. AFRREI will also promote synergistic activities to facilitate rural transformation of communities, businesses and rural households, using RE where appropriate. Providing energy access for rural areas in Africa is especially difficult, since rural populations are scattered, and have small power needs and low, irregular incomes, and public utilities are not effective in providing energy services.

57. The Initiative will (a) demonstrate the potential of combining new technology and financing with partnerships of local private sector and communities and (b) promote region-wide, community-based sustainable management of traditional fuels (policy and investments). AFRREI's strategy focuses on four main components. They are described below:

(a) There is to be systematic facilitation of private sector-led, commercially based service delivery to under-served "rural" areas emphasizing:

(i) A demand-driven approach that encourages and builds on local institutions;

(ii) Multiple supply options and delivery systems;

(iii) A long-term view of starting small and looking to grow big, building in flexibility;

(b) The key driver of the initiative will not be access alone but rural transformation, attention being given to non-farm generation and community needs;

(c) A balance must be achieved between affordability and sustainability while scaling up, incorporating very low cost designs and "smart subsidies";

(d) The Government must have the role of a market enabler, not a service provider.

58. The initiative aims to provide grants for capacity-building and loans for rural electrification programmes. AFRREI will initially focus on four countries in Africa — Mozambique, Uganda, South Africa and Zimbabwe.

Shell Foundation Sustainable Energy Programme (SEP)

59. The Sustainable Energy Programme (SEP) of the Shell Foundation, established by Shell International, will provide grants for projects that reduce the environmental impact of continued fossil fuel use or increase the access of poor communities in developing countries to improved energy sources and services. Under the broad category of Reducing impacts from fossil fuel use, SEP will support projects that address sustainable transport, climate change through market-based mechanisms for limiting greenhouse gas emissions, and the reduction of environmental impacts from conventional electricity generation. Under the category of Increasing access for the poor to better energy services, SEP will develop and support projects that:

(a) Encourage local businesses to find new ways to supply cleaner energy and improved energy services to poor people;

(b) Link the use of improved energy services to improving the ability of poor people to earn greater incomes;

(c) Improve the "enabling environment" necessary for markets to operate in ways that reduce energy poverty.

60. The types of projects that will be supported by SEP are research and analysis, technical assistance, education, training, conferences, study tours, pilot and demonstration projects. SEP will provide funding only for projects that are undertaken by non-governmental organizations and other non-profit groups working in the public interest. The Programme will fund up to US$ 17 million in the first three years with a target of US$ 22 million per year within 10 years.

Role of national Governments

61. In promoting sustainable energy development, national Governments can play a catalytic role by providing institutional and technical support, market-enabling policy and fiscal incentives, and facilitating the availability of financial resources. A brief summary of India's wind power programme is presented to illustrate the use of fiscal incentive mechanisms, policy measures, and the leveraging of international concessional finance to accelerate the development of wind power in India.

62. At the present time, there is approximately 1,000 MW of installed wind power, primarily in the States of Tamil Nadu and Gujarat, in India. The Tamil Nadu State Electricity Board (SEB) and several other SEBs have agreed to purchase wind power at the equivalent of about US$ 0.064 per kWh. The Indian Government also supports a large wind assessment programme with over 600 stations in 25 States to provide information regarding the best wind sites for development. Furthermore, India offers the following tax incentives to increase wind power development:

- Five-year tax holiday on income from sales of electricity;
- First-year 100 per cent depreciation on investments in capital equipment for wind electric power generation and other RE investments;
- Excise duty and sales tax exemptions for wind turbines;
- Waiver of import duties on a variety of components.

63. India is currently considering switching from investment tax benefits to production tax incentives to increase the performance of the deployed wind power projects. Lastly, India Renewable Energy Development Agency (IREDA), established in 1987, provides assistance in obtaining loans from the World Bank, the Asian Development Bank, and DANIDA for wind power development.

Notes

[1] A/AC.237/18 (Part II)/Add.1 and Corr.1, annex I.

[2] FCCC/CP/1997/7/Add.1, decision 1/CP.3, annex.